

Medical Aspects of Hospital Planning

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"I AM living in an ideal world of lifts, gas, baths, and double and single wards," wrote Miss Florence Nightingale (Woodham-Smith, 1949) just over one hundred years ago. She was then 33 years of age and was to live to 90 years, and she had already made her impact on hospital design and had done battle with architects and engineers. Her influence is still to be seen in our hospital buildings to-day, and it is only since World War II that any successful effort to break with tradition has been accomplished. The point emphasised is that buildings new to-day will require to be adapted and altered within the next fifty years to meet altered therapies and developments in medical science. Flexibility of design is imperative. It is essential that the architect should have freedom and encouragement to develop the artistic interpretation of his instructions if we are to keep our place in the new era of modern design. An escape from barrack block institutionalism is now on its way and we must keep in the forefront of our minds that these buildings are for patients—anxious, apprehensive people—and that design can contribute much to their sense of security and provide a sympathetic, as opposed to a disinfectant, atmosphere.

Since 1948 some £5,500,000 has been spent on hospital buildings in Northern Ireland—new buildings, adaptations, land purchases—and our Government is committed to capital expenditure of a further £15,000,000 on this work during the next ten years.

Never in the history of Ulster has so much new work been contemplated and never have so many people been involved. Apart from architects and engineers, doctors and lay members of hospital management committees are vitally interested, and they have much to contribute. A simple discussion of modern ideas from a medical point of view seems opportune and may stimulate interests and intelligent appreciation and enquiry. Many points may touch the controversial and there is no field where the fixed personal ideas of the user and the architectural fight against utilitarianism and functionalism are more likely to conflict.

It is proposed to describe some of the work planned or in process of building at the present time in terms of general hospitals. Much is being done for the other half of our patient responsibility—mental illness and deficiency—and as here the interest is more limited, it is not germane to this paper. Something will be said about the architect and his multiple employers, and this will lead naturally to a brief note on planning to meet demand. Then some specific units will be discussed and described, and finally some consideration will be taken of the future.

MODERN TRENDS IN ULSTER.

In casting back to the immediate post-war period, the most significant incident was a report (Delegation Report, 1950) produced by the governing body of the Royal Victoria Hospital, following hospital visitations by two working parties to France, Switzerland and the Scandinavian countries. Their conclusions and recommendations on seeing the best buildings on the Continent included the following indication of new trends:—

- “1. Multi-storied buildings rather than a series of pavilions or something intermediate in construction between these opposite types.
2. Recommendation that a general hospital should have 1,000 beds.
3. A ward unit should be 25-32 beds. The largest ward should contain four beds and there should be a liberal provision of single bedded rooms.”

These recommendations set an entirely new horizon for hospital planners.

From this multi-storied concept has arisen, after years of planning, the North-west Hospital, Londonderry. This large building, which is illustrated in Fig. 1 (centre inset) is already a landmark on the countryside, rising, in part, to twelve storeys. In two years' time it will be completed and equipped and opened for patients, and this will be an event of international importance in the hospital world.

This complete hospital will provide just under five hundred beds and all modern ancillaries, out-patients, casualty department, theatres, central sterile supply unit, laboratory, etc., at an approximate cost of over £2,000,000. This massive and impressive building has not sacrificed simplicity, and already there is a rugged attraction difficult to define.

Fig. 2 (centre inset) is a photograph of a model of the Ulster Hospital, Dundonald, demonstrating a rather different architectural treatment of the problem of general hospital design. The contrast of several buildings, some single and some of two or three storeys, is very attractive. This hospital, which will provide accommodation for pædiatrics, general adult facilities, and midwifery and gynaecology, will ultimately have five hundred beds and the approximate cost will be not less than £2,000,000.

Another hospital building in process of construction is the Nuffield experimental surgical unit at Musgrave Park Hospital, Belfast. The design of this unit is the product of teamwork under the directorship of Mr. Llewelyn Davies—part of a study into the functions and design of hospitals sponsored by the Nuffield Provincial Hospitals Trust. Eighty surgical beds on two floors will be provided with theatres, a central sterile supply unit and a diagnostic radiology department. Investigations in job analysis, functional nursing and many others are involved, and will continue for a minimal period of five years. The building should be ready for patients in 1957 and will cost approximately £150,000.

Further details of this interesting hospital will arise in discussion of ward units.

Vine (1952) has written that “so experimental and so empirical is the art of building hospitals that fortunately no one has yet been tempted into developing a ‘standard hospital.’ ” One would readily agree with this opinion as the develop-

ment of a design of hospital buildings requires to take into account local and special necessities and characteristics. Indeed, much money and not a little ingenuity has been expended on altering and adapting the standard workhouse buildings of the 1840 period. However, expediency and funds allocated on Civil Defence grants impelled the Hospitals Authority to build twenty-four standard units of hospital buildings in the past five years. The buildings are all exactly similar in skeleton construction and engineering services. They can be adapted internally to provide for a variety of uses—ward accommodation on the open ward principle—or departments for out-patients, radiology, physiotherapy or laboratory. A recent internal adaptation has created an excellent layout of an obstetric unit of twenty-eight beds with labour suite and all ancillaries. The buildings were planned by the technical staff of the Hospitals Authority with duality of purpose in mind, and internal construction is such that, despite the peace-time use to which they may be put, they can be rapidly adapted for in-patients in event of war or other disaster.

For some time the Belfast Hospital Management Committee and the Authority have been involved with architects in detailed planning of a new building on the Grosvenor Road site. This will provide a new Out-patients Department, Diagnostic Radiology Department and a series of eight major operating theatre suites, incorporating a Central Sterile Supply Unit for the whole hospital. This planning is well advanced and has presented many difficulties due to the limitations of the site.

Finally, there are three new buildings being designed which will be attached to or superimposed on old buildings. Each is an example of a difficult problem being solved in a different way. Fundamental to the exercise in each case is that the work of the hospital must continue. Difficulties in phasing the construction are considerable. South Tyrone Hospital, Dungannon, is designed as a single-storied building, accommodating theatres, labour suite, consultative out-patient, radiology, physiotherapy, casualty and reception, administration with central circulation to a multi-storied ward block. Coleraine Hospital and Erne Hospital, Enniskillen, are being developed on rather different lines, and in all three site limitations and problems of circulation have been a challenge to all concerned.

This statement represents only a small part of the work at present in building or planning or contemplation and is designed to indicate the scope and variety of original work in the Province.

LIAISON WITH ARCHITECTS.

Before dealing with specific units of special medical interest which make up a functioning hospital, it is perhaps timely to refer to the architects to whom we turn for expression of our requirements. It is a fact that in the United Kingdom there are no architects who are primarily concerned with the design of hospital buildings. Building work of this type has been so irregular and intermittent that such specialization is neither attractive nor feasible. However, there are now an increasing number of skilled architects interested and experienced and ready to develop the experimental and modern approach so essential in these days.

Tasks of these architects are not easy. It is notorious that an architect's most difficult client is a hospital board or authority. The basis of traditionalism common in the lay mind and the conflicting interests of doctors, nurses and administrators all contribute to the problem.

The structure and function of hospital buildings have become so complex that it is essential that the architects should have complete instructions from all concerned at the initial stage. This has long been a matter of concern, for it is clear that they cannot be instructed by a multiplicity of people. Therefore, before any drawings are prepared, a complete and well-considered schedule of accommodation must be prepared and agreed together with a general indication of design—multi-storied building—single-storied pavilions or a mixture of both. With this collected and agreed information the architect can think out his artistic solution to the particular problem and present his employing body in due course with sketch schemes and explanations of how he contemplates the finished building. Co-operative thinking is essential, and the architect, doctors and other staff require to discuss and agree all sides of their personal aspects of the building at a stage which precedes design.

Llewelyn Davies (1954) said at a conference on the Design of Health Buildings : "It is at this stage that the success or failure of most hospital projects is determined. . . . A slipshod programme is likely to result in enormous waste of effort and money, disappointment for the hospital authority and frustration for the architect, who is driven to prepare schemes which later must be drastically remodelled or even abandoned when the inadequacy of the programme is discovered."

These points which I have laboured are fundamental to any project, and it has been found by the Hospitals Authority that there is much merit in a co-ordinating team, competent to make decisions, acting as the direct link with the architect. Some form of modified dictatorship at some stage becomes essential to the successful furtherance of the project.

PLANNING FOR DEMAND.

This brings us by natural process to a vital matter with which hospital administrators are faced in consideration of new projects—the size of the accommodation required, the needs of the community in terms of beds, theatres and out-patient facilities. The local picture requires to be looked at critically and an endeavour made to assess actual necessity. We have accepted as a general principle in Northern Ireland, after much consideration of surveys and reports, that the need for acute beds can be met by a figure of 4 beds per 1,000 population. For long-term sick of all ages and geriatric cases a further 2 beds per 1,000 are required. For obstetric needs the birth rate, local or general, is taken and applied to the fact that the liberal use of a single maternity hospital bed in a year is twenty cases. Present Government policy indicates that hospital provision for 50 per cent. of all confinements should be made. It is perhaps wise to say here that the general tendency is for the demand for hospital confinement to increase, despite well-developed Health Authority domiciliary midwifery services.

The most recent work on the problem of planning to meet demand has been done by the Investigating Team of the Nuffield Foundation. The surveys and their results are fully detailed in the Report on the Function and Design of Hospitals (Nuffield Provincial Hospitals Trust, 1955). Methodology for precise assessment of bed needs by specialities and out-patient sessional requirements is given in simple statistical form. This is a most valuable contribution to our ideas on this subject, and it is of inestimable value to be able to make a quantitative estimate, based on sound criteria, and so clarify and consolidate instructions for the architect.

A final word on waiting lists for admission to hospital will not be out of place. These lists have long been suspect and it is indeed doubtful if they truly represent unsatisfied public demand. We have inherited the idea of the waiting-list which was so well publicized in the days of the voluntary hospitals. These lists emphasize the need for greater attention to bed occupancy rates. The fact that occupancy rates vary from one hospital to another, even as between hospitals of similar size and character, is well known. It has been demonstrated by Dr. Avery Jones (1953) that a general community hospital should have at least 90 per cent. bed occupancy. The national average for general hospitals is 85 per cent., which means that every staffed bed is on average vacant for one day or more in every week. It is clear that any complacency about bed occupancies of 80 per cent. or less is unjustified and all this is highly relevant to planning to meet demand.

GENERAL PLANNING CONSIDERATIONS.

The size of the hospital will be determined by a study of the many aspects of demand and the sub-division into speciality requirements will be detailed. These figures having been determined and the schedule of accommodation clearly defined and agreed, then the interpretation must in general rest with the architect. He must realise that the patients' reaction to their hospital environment is fundamentally one of fear and apprehension, and he must design with regard to sympathetic attraction and the creation of a sense of security. This is well within his artistic scope and affects not only the outside impression of the building but also the reception area and entrance, and finally the wards. He must create a building or group of buildings in such a way that the old prison-like mass does not exist. The problem of number of storeys—a high building of many storeys or a broad building of few or a mixture of both—will often be determined by the limitations of the site, the contours or the money available for the project.

Planning with room for expansion in future years by adding an additional floor or wing is often discussed. This is perhaps harmless as a theoretical exercise, but should not involve capital expenditure. It is in these days questionable whether hospitals should be planned for much expansion at all. There is perhaps justification for creating new buildings slightly larger than appears at present necessary or indicated. It may well be necessary to build another hospital in fifty years which can more cheaply involve new ideas to meet inevitable new therapies and techniques and siting can have relation to possible shift of population. Functionally, the multi-storied building has many advocates. It is clear that stacking ward units one above the other is an economy in structure both in building and engineering

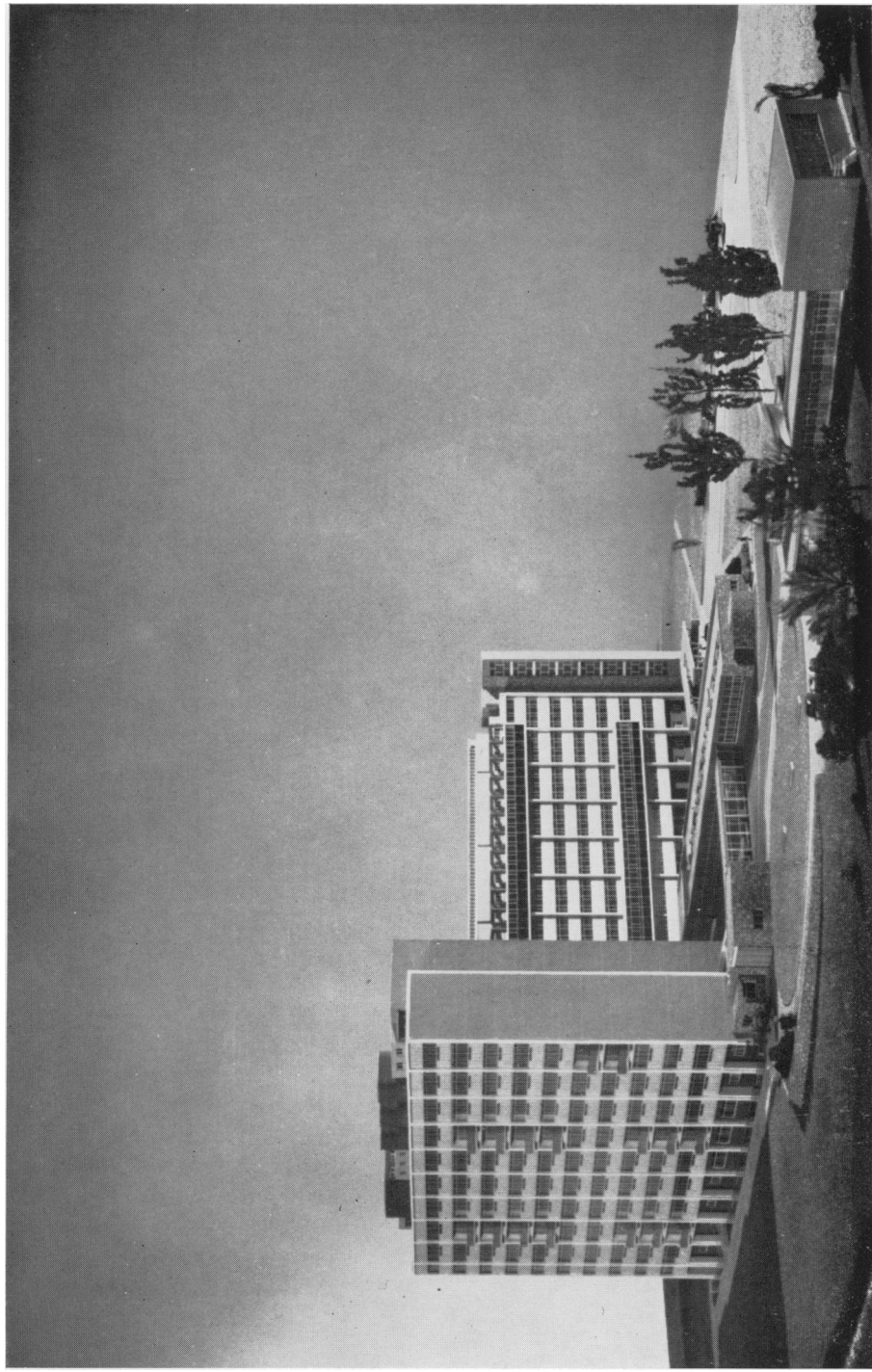


Fig. 1—North West Hospital, Londonderry.

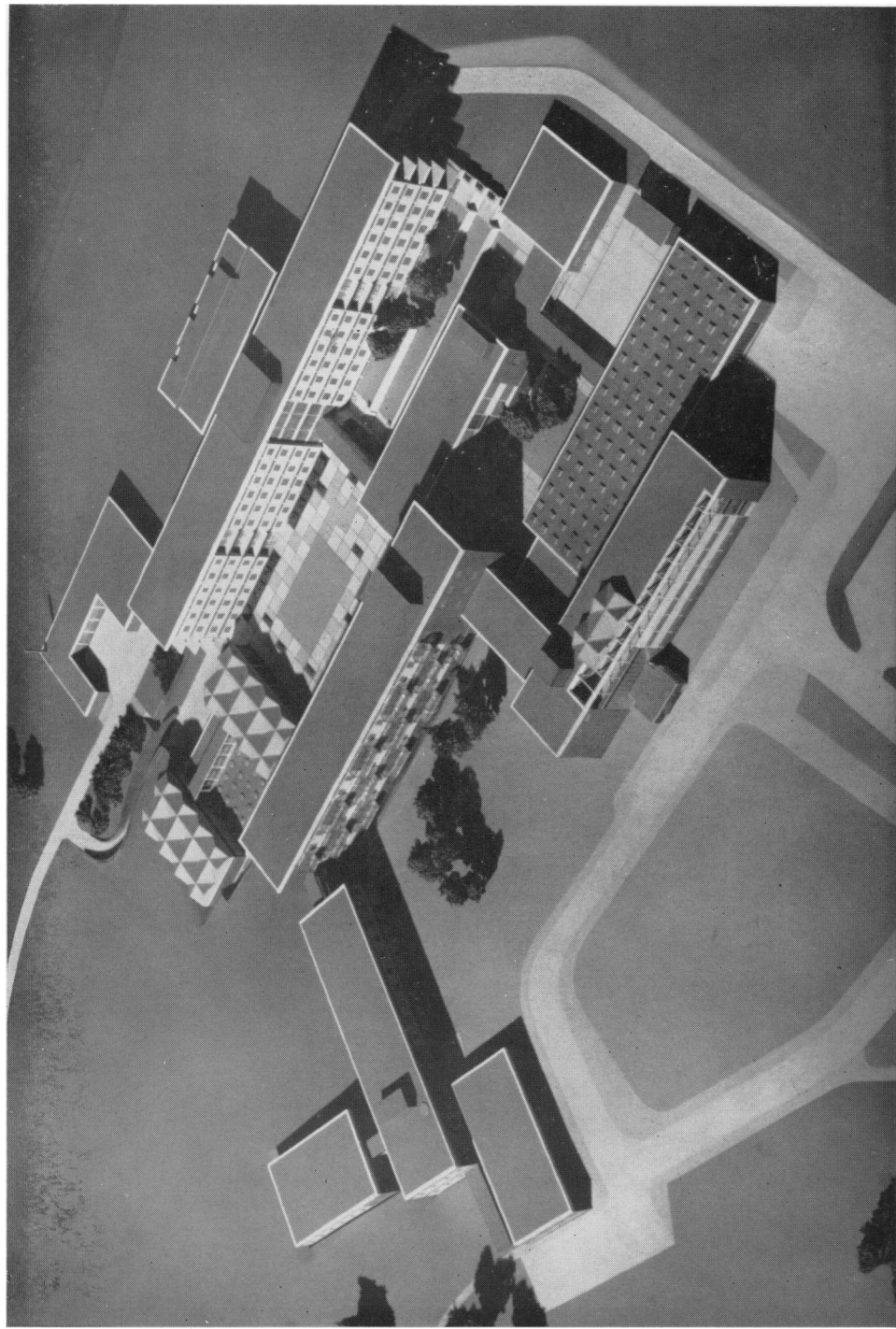


Fig. 2—Ulster Hospital, Dundonald, Belfast.

services. The majority of wards can be identical in layout and vertical plumbing stacks, pipe runs and service lifts can deal with several floors. Vertical planning has been said to be "good for things" as opposed to horizontal "better for persons." There is much to be said for good scenic perspective if, in fact, patients look out of the windows to the world around, and unobstructed sunlight and good ventilation provided by the vertical planning for ward units. Other parts of the hospital with less uniformity of size and shape can with advantage be horizontally planned, and it is quite clear that there is no economy in building departments of differing shape and floor area requirements one above the other.

The optimum size of a general hospital does not greatly concern us in this paper in that outside our cities our populations and catchment areas do not justify large hospitals. However, it should be said that present consensus of opinion is that no general hospital should have more than eight hundred beds and the ideal number for administration is around six hundred.

WARD UNITS.

The size of a ward unit has been much debated in recent years with a wide variance of opinion of between twenty and fifty beds. A ward unit is the nursing responsibility of a sister and her deputy with staff and student nurses. Recent work on team nursing routines which will be put into practice by the Nuffield Provincial Hospital Trust investigators at the new surgical unit at Musgrave Park is of considerable interest. Trained nurses and students in teams will have patients assigned to their care. This will relieve the sister of some direct responsibility for the patient's care and she should be able to assume overall supervisory responsibility for a greater number. Patients will benefit from the team assignment routine, as they will have more trained staff supervision and actual nursing care. It was found in a recent survey that over 75 per cent. of nursing duties in general hospitals were, in fact, carried out by student nurses.

The present indications are that a forty-bed ward unit is the ideal size, and certainly this number has appeal and realism in provincial hospital planning in Northern Ireland. The ward unit should be sub-divided into open wards of four beds, arranged two deep parallel to the window wall, six-bed wards similarly arranged, and single rooms of at least 20 per cent. of the total. Single rooms require their own W.C. and wash-hand basin, as they will serve for isolation cases as well as gravely ill or dying patients, disturbed or noisy patients, and for the diminishing number of patients prepared to pay for their privacy. Two bed wards are now realised to be a psychological risk. In point of cost, Mollander (1953) has shown that in Sweden ward units of six-bed wards are appreciably cheaper to build and run. It is indeed obvious that two-bed depth of building is more costly than a shorter, broader construction of three-bed depth. Modern planning is to incorporate a mixture of both four- and six-bed wards, and this makes for maximum flexibility of use. Two illustrations of the most modern ward unit planning in the United Kingdom at present with contrasting architectural treatment are shown.

Fig. 3 illustrates the layout in the Nuffield Unit being built at Musgrave Park—four-bed wards, six-bed wards and single rooms are provided. Attention is particularly drawn to three significant features in this layout :—

- (i) **Treatment Room**—There can be no doubt that this provision is a great advantage. All nursing and medical procedures (dressings, lumbar punctures, enemata and special examinations) can be carried out by transfer of the patient in his bed. This room has a dirty utility (old terminology sluice room) on one side and a clean utility (sterilizing room) on the other, both communicating by hatches.
- (ii) **Day Space**—All new planning includes an area for patients to sit and read or write, receive visitors or have meals. With early ambulation around 60 per cent. of patients can sit in day space and this innovation is greatly appreciated.
- (iii) **W.C. and Bath Accommodation**—Here again, the early ambulation régime reduces the hardship of the bedpan and takes from nursing one of its least enjoyable ploys. Patients are wheeled on lavatory chairs to W.C.s with wide doors, as illustrated. Note should be taken of these and other ancillary rooms which are more in line with modern requirements. Ancillary accommodation has been notoriously meagre and inadequate in the past and the natural swing is to a generous allocation of this space.

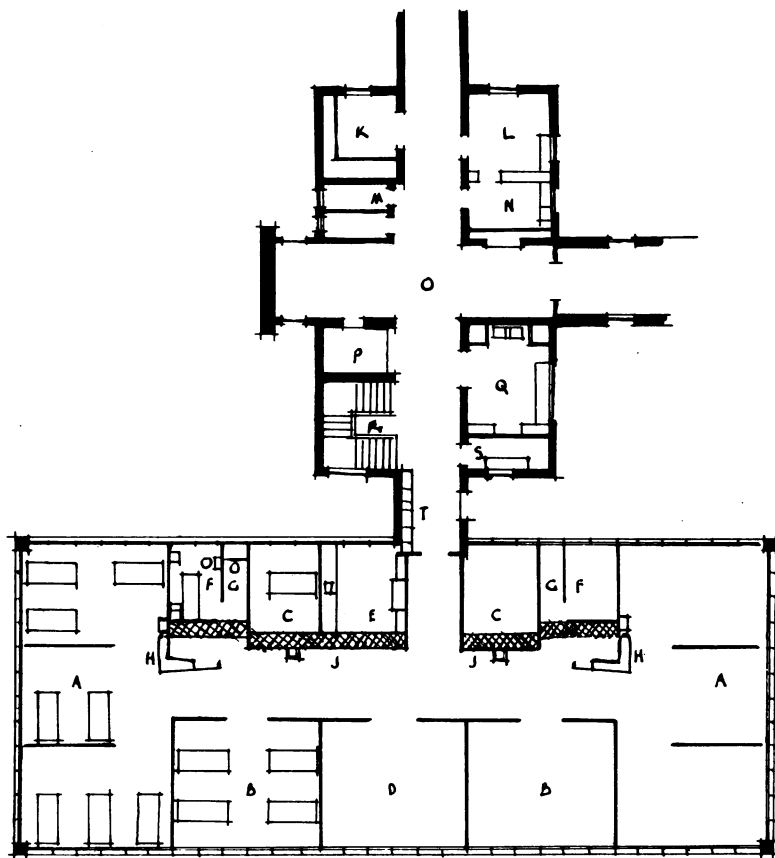


Fig. 4—Ward Unit, Vale of Leven Hospital, Alexandria, Dumbartonshire.

Fig. 4 shows a ward unit at the Alexandria Hospital, Dumbartonshire, which was built for civil defence and opened in late 1955. A 52-bed ward unit, sub-divided into two units of twenty-six beds with small sick-rooms, is illustrated. This is a very pleasant bed disposition, with good observation from the nurses' station. It will be noted that at this hospital no treatment room or designated day space has been included.

In both these units curtain cubicalisation of beds has been carried out to afford maximal privacy when required or desired. The open-type ward—that is a ward open to the corridor and without doors—is now accepted, and the corridor can be included in bed-space calculations. Sex segregation must be borne in mind in consideration of ward unit design and the necessity for central access. Individual bed-lighting and radio now appear to be standard and night-lighting should be at floor-level.

It has been a long journey from the traditional Nightingale ward of twenty-three beds in rows to the modern flexible unit.

At a meeting of the International Hospital Federation in London in 1953 representatives of most countries of the world affirmed that scarcely anywhere is the old type of ward being built, and where they exist they are being partitioned.

CHILDREN'S WARDS.

The general pattern should be observed of small flexible easily isolatable wards of a maximum of six beds or cots. Accommodation for the mother of an acutely ill child was regarded by the late Sir James Spence as an indispensable part of nursing in a children's unit. The needs of adolescent age groups should be provided for, as they have in the past fallen into a rather unfortunate no man's land. Treatment rooms are again very necessary, as are day rooms. Many paediatricians hold that the age groups should be mixed as in the normal family group. This is probably sound, as the elder children take pleasure in helping to entertain the younger ones. A properly designed milk-room, preferably divided into two compartments, should be provided for sick infants. In planning, it is sometimes feasible to relate the milk-room to both sick babies' section and the obstetric unit, and thus save duplication of staff and expensive equipment.

A children's ward requires an admission unit for the screening of children admitted without a definite diagnosis and possibly incubating one of the infectious fevers. This unit can be small and consist of single rooms or two-bed wards. This accommodation can possibly be combined with a small isolation unit where the hospital is situated at some distance from the central fever hospital. There is little future under present conditions for multiple small fever departments throughout the country and in the main they have disappeared. Centralizing of the special skills and equipment required in this field is an economy of personnel and equipment.

This description is of a children's department of a general hospital as opposed to a paediatric hospital which has its own special departmental problems not proper to this paper.

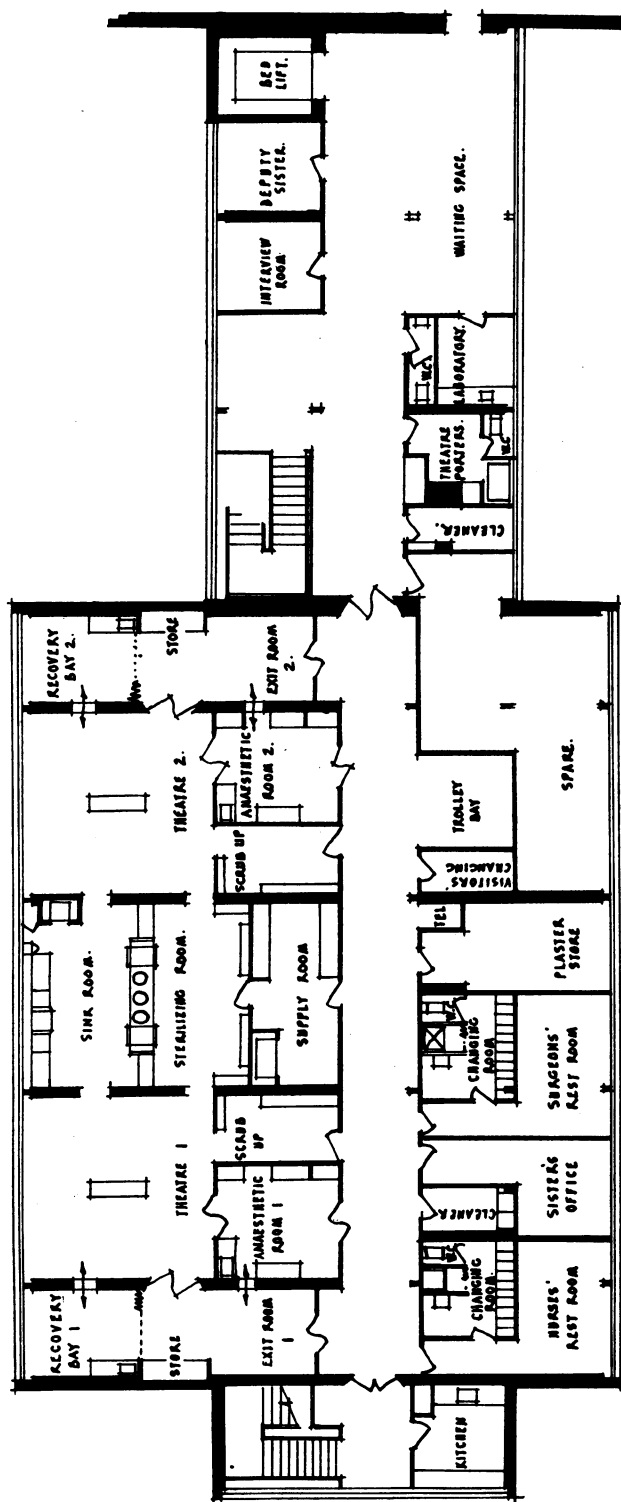


Fig. 5—Theatre Suite, Nuffield Unit, Musgrave Park Hospital, Belfast.

There is much to be said for building the children's department of a general hospital as a separate or dispersed unit. This is a matter of personal opinion.

OPERATING THEATRES.

It is now generally accepted that a theatre suite of twin operating rooms is the minimal requirement for a modern surgical unit. The building of a single theatre is much more costly than a twin unit with shared expensive ancillary accommodation and equipment. Dispersed theatres, situated in close proximity to the surgical wards, have been the common picture for many years. Proximity to the wards with good access and circulation is important, but there is much to be said for grouped theatres either in single-storied building or vertically stacked as in a large hospital. The accepted layout in the latter is of vertical stacking in twin suites, serving a multiplicity of surgeons and specialities. Theatres should be common to the operating needs of the hospital and should no longer be labelled with the name of the surgeon. The basic requirements of each new hospital should be considered as a special study in the determination of the number of theatres required.

Each theatre is traditionally not less than four hundred square feet, and in a twin suite common design is to place one on either side of an area accommodating sink-room and sub-sterilizing room.

Fig. 5 illustrates a theatre suite of this design, showing an anæsthetic bay for each theatre and a recovery-room. There is a growing feeling that four hundred square feet is in excess of necessity for each theatre and that this size is tied up with the outmoded fashion of having the surgeons' scrub-up and banks of sterilizers actually in the theatre together with a variety of space-occupying equipment. If a reasonable working area outside the theatre is provided then a much smaller actual operating area will be required. Such additional apparatus as is required

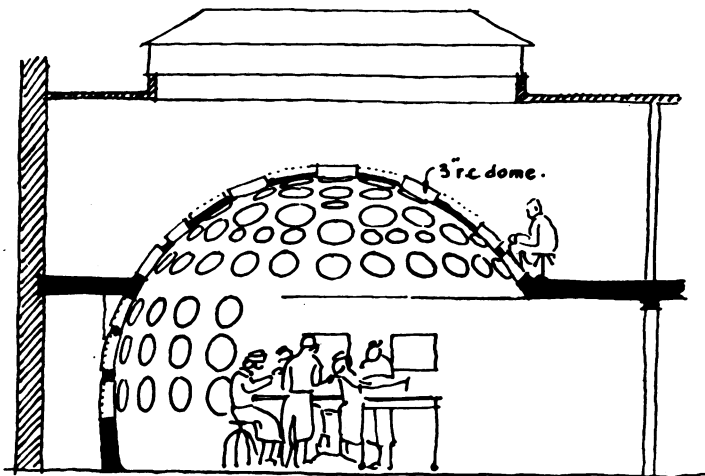


Fig. 6—Dome-shaped Theatre.

can be brought into the theatre if and when required. There is much to be said for this idea, and, indeed, recent experimental work by Goldfinch (1954a), Chief Architect to Birmingham Regional Hospital Board, on theatre air purification and lighting involved such a concept. Fig. 6 illustrates the modified egg- or dome-shaped theatre which he produced in an actual "mock-up" working model. Theatre lighting is still only a partially solved problem and the sufficiently powerful, easily focused, shadowless lamp without heat emission has not yet been manufactured. Good general lighting should be available in the theatre and windows are unnecessary; good special lighting for major operations with adequate secondary lighting for any simultaneous minor operation or manoeuvre. The illustration of Goldfinch's theatre, developed following visits to continental hospitals, shows lighting by means of multiple projectors set flush in the walls and domed ceiling. This was an impressive experiment and the impression gained was that it is rather in advance of our times and the scialytic lamp is still the choice of our surgeons. Piped gases for the anaesthetist and suction and diathermy and cautery for the surgeon must be readily accessible. A boom carriage is the present solution.

The theatre suite flooring requires to have anti-static qualities and the conventional tiled-wall finish has been superseded by hard washable paint. Experimental work is being done in Northern Ireland with plastic paint finishes, and the results are promising. An anaesthetic room or bay, fully equipped for induction, is planned in suite with each theatre. A recovery-room of about one hundred and fifty square feet, equipped for resuscitation, blood transfusion, oxygen and suction, is related to each theatre. This is for immediate recovery where the patient is still under the supervision of the anaesthetist and theatre nursing staff and where the patient may be retained for a maximum of a few hours before being transferred to his ward of origin. In large hospitals, teaching hospitals and the like a special recovery ward of 10-12 cubicle-ised male and female beds will, in my view, be a development of the future. This idea has been described in America. A doctor and a highly trained staff of nurses will here have the skill and equipment to deal with the immediate post-operative period, and patients may be held here for periods up to forty-eight hours or more. Matrons will have no enthusiasm for this idea, as it will localize and centralize acute surgical nursing. In smaller hospitals immediate recovery-wards should suffice. Surgeons' scrub-up, conventionally overlooking each theatre, with changing- and rest-rooms for doctors and nursing staff and the usual offices and ancillaries complete the suite. The entire area requires to be air-conditioned, a suitable temperature range being 65°F. to 80°F., with a relative humidity of 60 and 65 per cent. Adequate air changes will be developed and air purity achieved by air filtration to eliminate particles greater than 5-10 microns. Filtered air inlets may be positioned in the theatre ceiling with low-level extraction, and the maintenance of a positive pressure is essential.

CENTRAL STERILE SUPPLY UNIT.

A centrally situated substerilizing area between twin theatres has been mentioned, and this brings us to the important consideration of a Central Sterile

Supply Unit. All general hospitals should have a centrally situated autoclave room for sterilizing drums or packs of ward dressings, gowns, masks, etc. It is regrettable that in many provincial hospitals this responsible work is entrusted to a possibly haphazard routine carried out by a boilerman or porter without supervision. This state of affairs is, however, being gradually corrected. The first stage in the concept of a Central Sterile Supply Unit was the incorporation in the central autoclave room of a syringe service department to serve the whole hospital. This service has been evolved in several hospitals in England with complete success. The next stage is to add to this department the setting up and sterilization of certain set trays for procedures such as catheterizations, lumbar punctures, etc. The final stage in a complete Central Sterile Supply Unit is the preparation and sterilization of surgeons' instrument trays for specific operative procedures. This final step—common practice in U.S.A. and Canada—has not yet been taken in the United Kingdom. However, we should plan for the full gamut of this range, and, meantime, theatre substerilizing will cope with the surgeons' trays.

Nuffield investigators (Nuffield Provincial Hospital Trust, 1955) report on this subject as follows :—

“The advantages of a Central Sterilizing and Supply Department are believed to be partly in economy in the provision of expensive servicing equipment, saving of nurses' time, better care, and, therefore, longer life of instruments and utensils and few losses of all materials because of better control at all stages. But the advantage lies principally in the provision of facilities which make possible the routine use of the most reliable aseptic techniques.”

On the Central Sterile Supply Unit generally we will continue to develop and expand our ideas and learn from the experience of installations in our new hospitals. Much has still to be learned. The necessary size of such a central unit is somewhat vague. In the Nuffield Unit at Musgrave Park Hospital a square footage of 2,457 is planned to serve 80 surgical beds and a total of about 720 general beds. Goldfinch (1954b) has said the space needs are approximately 2,300 square feet to serve a general hospital of 275 beds. In large hospitals with stacked theatres the Central Sterile and Supply Unit can occupy part of the stack—basement preferably—communicating with the theatres by hoist and chute. Circulation for general issues of syringes, dressings, etc., must also be taken into account. In small hospitals the complete unit can be conveniently sited adjacent to the theatre suite.

OBSTETRIC UNITS.

These ward units have their own particular requirements, and here I deal with maternity accommodation in a general hospital and not a complete maternity hospital. Small open wards of four beds—and not more than six—providing an area of 120 square feet for each bed and cot, with one-sixth of the total bed allocation for antenatal admissions, is common basic planning. The whole unit should be highly flexible and a number of single rooms (with W.C.) should be included for isolation and other purposes. With modern therapy the spectre of puerperal sepsis does not create such a problem and the old idea of a septic ward appears to have passed. First stage rooms adjacent to a W.C. are necessary.

A minimum of two should be provided, the maximum number being determined by the number of lying-in beds. The Labour Suite should consist of two Delivery Rooms with a substerilizing and sink-room between them. One Delivery Room should have the special finish of a theatre, and here Cæsarean sections can be carried out.

No anæsthetic room or recovery ward is considered necessary. Provision of nursery accommodation for all or some of the babies has been a matter of much change of opinion and obstetric fashions in past years. The present fashion, supported by demand feeding, is for the baby's cot to be in the ward with the mother. In many hospitals there is still nursery accommodation for one cot per lying-in bed. Perhaps it would be realistic to provide nursery space for half the potential occupants and so try to anticipate possible change of fashion. Such a nursery can serve for noisy and anti-social infants. Provision for sick infants and premature babies is a special problem, and in the latter case the need should be determined by distance from a central premature baby unit. The special needs and staffing skills of such a department and the ease with which these infants can be transferred to them in ambulance incubators all influence us to centralize this problem. A well-designed milk-room will be essential, and as in the general ward units a treatment-room and liberal day-space should be provided.

OUT-PATIENT DEPARTMENTS.

One of the most striking developments in hospital services since 1948 has been in the provision of consultative out-patient facilities. Diagnoses and treatment of out-patients is perhaps the major function of a hospital to the community which it serves. It is commonly by its out-patient facilities and often by the design, organization and functioning of this department that a hospital is judged by the general public. The foyer and reception are, therefore, of first importance, and a separate out-patient entrance and not one shared with in-patients is highly desirable. A compromise between the hotel entrance type and the austere utilitarian should be achieved. The vitally important Records Department should be in close association with reception. A pleasing and liberal general waiting area is required which can be furnished on contemporary lines as a reaction to the rows of benches of olden days. A mobile or permanent canteen should be designed in this area and this entire location should be under the sympathetic supervision and control of reception staff. Sub-waiting will be essential in relation to the consultative suites. On the actual design of the rooms comprising a consultative suite there is considerable divergence of opinion. It is clear that doctors are influenced by and would seek to have reproduced particular units where they have had previous experience of working. It is, therefore, often impossible to reconcile completely such a diversity of opinion. Only in a large teaching hospital is there justification for "tailor-made" planning to meet speciality requirements, and here you have a separate and distinct problem.

In provincial hospitals it is essential to provide a series of rooms for consultation and examination, with or without separate changing cubicles, adequate to meet

the estimated sessional requirements of the area. A variety of interpretations of such needs have in the past been produced, and, in general, one is influenced by the strong desires of the doctors and staff who will use these departments. However, there is much to be said for dogmatism at times, and with experience of many efforts at such planning the following views are expressed.

Consultative suites should consist of a series of inter-communicating rooms of perhaps 150 square feet, each fitted with a wash-hand basin and examination couch, and having in one corner a curtained area for undressing. This series of general purpose rooms can be broken up in groups of three or four rooms and adequate subwaiting space must be designed. This type of planning will ensure maximal flexibility of use, and it will be possible to allocate suites to different specialities, according to demand. Some specialities may perhaps require one room, while another can usefully involve six rooms. There is much to be said for uniformity of pattern of these suites and an inflexible purpose-planned suite which can be used for no other purpose is an extravagance which we can ill-afford in these days.

Special facilities and arrangements within this broad plan can be made for special departments, notably ophthalmology and E.N.T. Here a plea is made for cessation of demand for rooms of 22 feet in length for ocular refractions when almost similar results can be achieved by indirect methods. Treatment-rooms, laboratory side-room, specimen-room communicating with clinette-type W.C.s are necessary. Some small rooms—perhaps two or three—can with advantage be included without precise designations. This will improve flexibility and meet some diagnostic need which cannot at the moment be foreseen. It is essential that access and communication with diagnostic radiology, laboratory and possibly physiotherapy departments should be reasonable.

Finally, on the block planning of out-patient departments, there is much to be said in favour of a single-storey building capable of expansion.

CASUALTY DEPARTMENT.

This is an important unit in a hospital of any size and in a provincial hospital it should be sited adjacent to the Consultative Out-patient Department. Casualty diagnosis and treatment is probably the most responsible work placed in the hands of junior medical staff. The proximity of the Out-patient Department, where consultants may be available for consultation and advice, is an advantage. A minor theatre and three or four treatment-rooms with examination couches, sterilizing facilities, are required with separate subwaiting. A doctor's room for interview with police, patients' relations, etc., is an advantage. Recovery-rooms (two or three) for short-period detention are essential for observation purposes. Casualty subwaiting and reception should be carefully planned, and it is often possible in an average-sized hospital to have a common reception and entrance for this department and consultative out-patients.

Finally, it must be borne in mind that about half of all casualties are not, in fact, surgical but medical, and a good casualty department should have designated rooms for the examination and treatment of such medical cases. The size of this

department will be related to the local demand for these facilities which again depend on local industrial undertakings. Diagnostic radiology, physiotherapy and laboratory departments are highly specialized units designed to meet the needs of the community. The modern design of each of these departments has been worked out in considerable detail in recent years in consultation with the consultants concerned, and a measure of uniformity of layout has been achieved. Detailed discussion of these units is not of general interest and does not justify inclusion in this paper.

THE COST AND THE FUTURE.

It is common knowledge that the cost of our health services has exceeded all predictions and the cost of new hospital buildings has followed this general trend. It has been computed that since 1948 building costs have risen by some 50 per cent., and in Northern Ireland we have an additional burden in that building costs appear to be higher than for the erection of similar structures in Great Britain. This difference has been estimated at possibly 15 per cent. and arises mainly through our need to import a large amount of the materials required. This difference in building costs is particularly marked where there is any departure from traditional methods of building. There is no completely satisfactory method of reckoning building costs which can be used on a comparative basis. For many years cost was reckoned with the hospital bed as the unit. This unitage can only be valid for comparison when all hospitals are providing similar services which is obviously completely impracticable. In separate entities in a hospital plan, such as a nurses' home, this is comparatively simple, as one can then compare like with like. In Northern Ireland, in a well-designed nurses' home to provide at least twenty-four nurses' bedrooms, but without recreation or training school accommodation, the cost per bed is between £700-£800.

The cost of a complete hospital providing out-patients, casualty, maternity general ward units with theatres, X-ray and physiotherapy may well exceed £2,000 per bed. This does not allow for external engineering services, such as boilers, steam pipes, and main drainage. More realistic is an estimate made on the external measurements of the proposed buildings, and this may be taken as not less than £5 per square foot. In cubic measurement the cost is 6/- to 7/- per cubic foot. This clearly indicates the desirability of realistic and effective use of floor-space and of limiting ceiling heights. Long, wide, and high corridors and over-generous size of ancillary rooms create extravagance. "Factory area finish" has been resorted to in America and all areas in a hospital building not encroached on by patients are left with a rough finish. This is a sound idea. The present tendency is for the cost of heating, ventilating, and electrical services to increase more rapidly than the cost of actual building. An approximate percentage allocation would be for building 60 per cent., engineering services 30 per cent., and fees for architects, engineers, and quantity surveyors 10 per cent. To the building costs must be added the equipment which may be reckoned as not less than 10 per cent. of the total cost.

It will be clearly seen that we have here a problem in parallel with the economic chaos of the present-day world.

Those of us who have weathered the first half of this 20th century may well feel that it will stand out in history as a period of revolution. The arts of healing have advanced with rapidity and the complexion of medicine has undergone radical change. It is a safe prediction that this phase will proceed apace. What then are we doing to keep our buildings, and especially new buildings, in line with this progress? It is true to say that no general enlightenment has emerged and the traditional buildings good for one hundred years and longer are still being planned and built.

It is clear that future emphasis will be centred on out-patient facilities and away from the ward unit. Preventive medicine is due for renewed attention and the whole focus of medical care will inevitably centre away from the hospital bed. Flexibility of planning is, therefore, medically vital, and building for a short term, and at most not more than fifty years, should be our enlightened policy. The fantastic costs of traditional building drive us to this conclusion even if such determination was not crystal-clear on purely medical grounds.

From recently built admission hospitals for mental illness in England the ability to produce very attractive buildings at a modest cost which will last for at least fifty years has been clearly demonstrated. A new approach and experiment in materials and design, and, indeed, a new conception, must be seized by all concerned in the creation of hospital buildings. It is hoped that the excellent experimental work being carried out in this country by the Nuffield Provincial Hospital Trust will continue and develop on these lines. It will require courage to break away from the conventional traditions of architecture of past years and give our communities some adventurous designs in keeping with our times. My personal hope is that architects may be encouraged to design on contemporary lines and that the children of the atomic age may be spared the unrelieved mass of utilitarian buildings. We must have regard to recent buildings in America and fresh ideas from the Continent. Much leeway still requires to be made up.

The paper commenced with mention of Florence Nightingale, and I can do no better than conclude by quoting again from Professor Vines (1952): "Hospitals are an experiment on an international scale and they are of international interest; it is time that we in England took active steps to regain the international pre-eminence that Florence Nightingale once bequeathed to us."

In thanking the Chief Medical Officer, Ministry of Health and Local Government, for permission to publish this paper, I make it clear that opinions expressed are personal and not necessarily those held by the Ministry or the Hospitals Authority.

I am most grateful to my colleagues in the Hospitals Authority for help and encouragement during the past five years. In particular, I wish to thank Mr. E. H. Jones, Dr. W. A. Brown, Mr. Scatchard, Mr. Harris, and the Chairman and members of the Authority's Works Committee.

Finally, I wish to thank Mr. Gillingham, with whom I spent many pleasant hours in search of the fundamentals of modern hospital design.

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REVIEW

AMPHETAMINE IN CLINICAL MEDICINE: ACTIONS AND USES. By W. R. Bett, M.R.C.S., L.R.C.P., F.R.S.L., L. H. Howells, B.Sc., M.D., F.R.C.P., and A. D. Macdonald, M.A., M.D., M.Sc. (Pp. 86. 7s. 6d.) Edinburgh and London : E. & S. Livingstone, 1955.

THIS book, as its title suggests, deals with the therapeutic uses of amphetamine ("benzedrine"), dextroamphetamine ("dexedrine"), and related compounds. It includes an excellent description of the pharmacological action of the drugs by Professor Macdonald.

The value of the amphetamines in the treatment of such varying conditions as obesity, alcoholism, narcolepsy and enuresis is indicated.

An account is given of the use of the drugs as "pep pills" or "energy tablets."

The authors state that the book "is intended merely as a guide to the general practitioner as to when and when not to employ this basically useful but frequently misused drug, and in what dosage." It may be said that, on the whole, this aim is fulfilled. However, the danger of the use of the amphetamine preparations, particularly in the presence of coronary artery disease, is not sufficiently emphasized.

J. F. P.